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DEEP WATER HARBORS IN THE SOUTHEAST

by D. P. Billard

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DEEP WATER HARBORS IN THE SOUTHEAST

D. P. Billard[1]

For the purpose of this paper, the "Southeast" is assumed to encompass the area under the jurisdiction of the South Atlantic Division, Corps of Engineers. The deep water harbors in that area provide deep-draft water transportation facilities for the needs of industry within and beyond the boundaries of North Carolina, South Carolina, Georgia, Florida, Alabama, and a portion of Mississippi. The coastline of that area is indented with a goodly number of deep water harbors which are capable of accommodating normal deep-sea traffic.

In some instances the present-day harbors in the southeast are the result of incremental development of the commercial trade arteries of those who first settled the region. Such development progressed over a period of many years as the needs of commerce dictated. Other harbors are of more recent vintage, having been born of the need for expanded transportation facilities in areas wherein natural conditions for the establishment of ports were meager or non-existent.

In the early days of our country, the policy was established that the Federal Government has jurisdiction over commerce on navigable waterways of the United States. As early as 1824, Congress charged the Corps of Engineers with the care of rivers, harbors, and waterways. Through specific processes, culminating in Congressional action, suitable navigable channels are provided and modified in accordance with traffic patterns and trends. River and harbor improvements are adopted as authorized Federal projects through the above-mentioned processes. Such authorization establishes specifications for depth, width, length, and other pertinent features. All of the deep water harbors in the southeast are authorized Federal projects. In addition thereto are deep water areas not yet used or developed for commercial navigation which provide a potential for further expansion in that region.

There are twenty-three projects that warrant consideration in discussing deep water ports in the southeast. Figure 1 indicates the southeast area; Figure 1 and Table 1 enumerate the deep water ports and the authorized depths of main harbor channels.

North Carolina, South Carolina, and Georgia each are served by two deep water harbors. Morehead City and Wilmington Harbors are the ports of North Carolina. Georgetown and Charleston Harbors serve South Carolina. Georgia traffic moves through Savannah and Brunswick Harbors. Florida, with the longest shoreline in the United States, is served by fourteen deep water ports, eight on the Atlantic coast and six on the Gulf coast. Along the east coast are Fernandina, Jacksonville, Canaveral, Fort Pierce, Palm Beach, Port Everglades, Miami, and Key West Harbors. Charlotte and Tampa Harbors are on the Gulf coast of peninsular Florida. Carrabelle, Port St. Joe, Panama City, and Pensacola Harbors are on the Gulf coast of western

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DEEP WATER HARBORS IN THE SOUTHEAST

FIGURE 1

TABLE 1

Deep Water Harbors in the Southeast

Harbor	Authorized Depth (Feet)	Harbor	Authorized Depth (Feet)
Morehead City, N.C.	30	Miami, Fla.	30
Wilmington, N.C.	34	Key West, Fla.	30
Georgetown, S.C.	27	Charlotte, Fla.	32
Charleston, S.C.	35	Tampa, Fla.	34
Savannah, Ga.	34	Carrabelle, Fla.	25
Brunswick, Ga.	30	Port St. Joe, Fla.	32
Fernandina, Fla.	32	Panama City, Fla.	32
Jacksonville, Fla.	34	Pensacola, Fla.	30
Canaveral, Fla.	27	Mobile, Ala.	32
Fort Pierce, Fla.	25	Pascagoula, Miss.	22
Palm Beach, Fla.	25	Gulfport, Miss.	30
Port Everglades, Fla.	35		

mainland Florida. Alabama is served by a single port, Mobile Harbor. Mississippi has deep-water facilities at Pascagoula and Gulfport.

Most of the above-mentioned harbors have served deep-draft commercial navigation for many years. In numerous instances Federal authorization for channel depths sufficient for the needs of ocean-going vessels then in use date back to the 1800's or early 1900's. During the 1930's, three harbors on Florida's east coast, Fort Pierce, Palm Beach, and Port Everglades, were adopted as Federal projects after having been provided initially by local interests. In 1936 modifications were adopted wherein Morehead City Harbor became a deep water port after having long been under Federal authorization as a shallow draft improvement. The latest entry on the listing of southeast harbors is Canaveral Harbor, Florida, a project sponsored over an extended period by local interests but not authorized for Federal improvement until 1945. Canaveral Harbor is unique in that it is a completely new development. The project provides for an entrance channel dredged from the Atlantic Ocean through the barrier land strip to a turning basin enclosed by a dike near the easterly shore of Banana River. Provision for connecting with shallow-draft navigation in the intracoastal waterway is also included. Construction of the harbor and entrance channel was completed in 1952; jetties at the ocean-end of the entrance channel are now under construction. Terminal facilities in the harbor are being provided by local interests. Limited use is being made of the project at this time by light-draft craft attached to the U.S. Air Force and by fishing vessels. It is anticipated that dee-draft commercial traffic will soon be moving over Canaveral Harbor.

It may be seen that the authorized project depths range from twenty-two to thirty-five feet. At locations where prevailing wave or swell action has proved hazardous to navigation, additional depth is provided in the entrance or bar channels. Authorized project depths are established by the needs of vessels serving in the transportation of principal commodities. The trend in shipbuilding is, and has long been, toward construction of deeper-draft ships. The harbors of the southeast have kept pace with that trend. Figure 2 illustrates that trend and shows the increase in passages of deep-draft vessels. A study of the sequence of development of many southeast ports reveals that

COMPARATIVE STATEMENT OF TRIPS OF VESSEL DRAWING 28 FEET OR MORE

DEEP WATER HARBORS IN THE SOUTHEAST

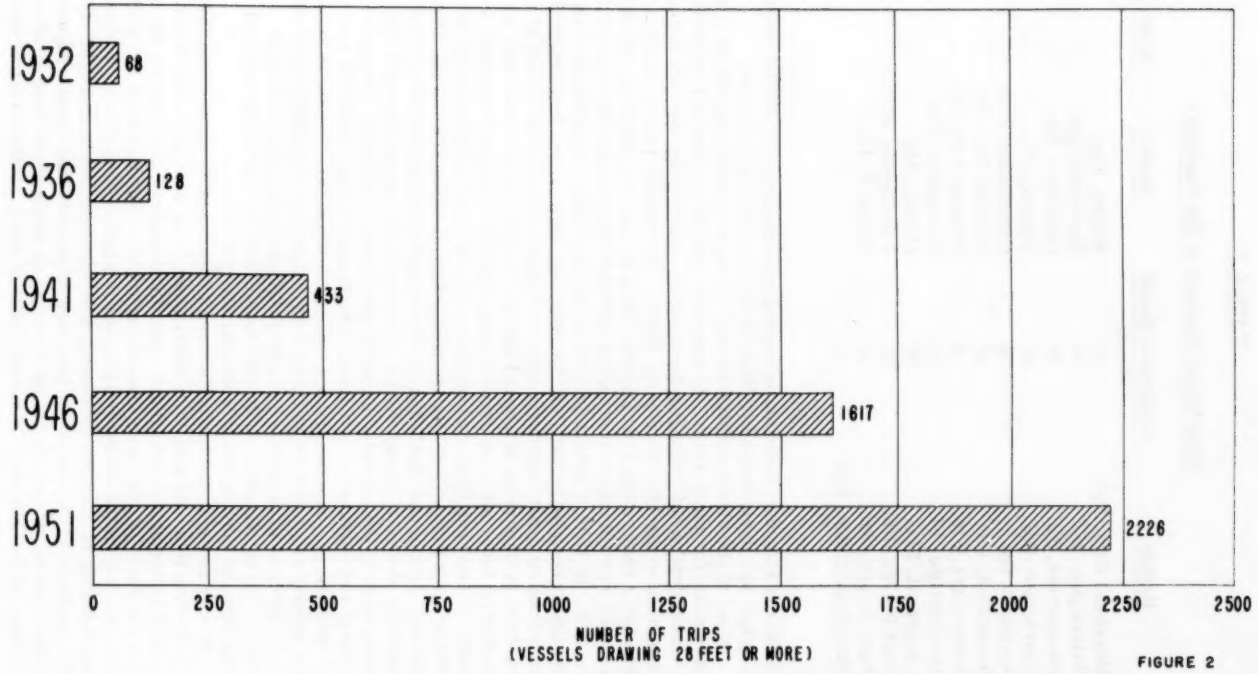

FIGURE 2

depths have increased incrementally in keeping with the concurrent increase in the draft of ships. Pertinent examples of such harbor development are the ports at Wilmington, Charleston, Savannah, Jacksonville, Tampa, and Mobile.

Deeper water has been authorized for most of the major southeast ports since the conclusion of World War II. The principal factor in justification of such deepening was the entrance into the commercial trade of many tank vessels which were constructed during the war to accommodate the needs of our armed forces. Those tankers, referred to as T-2's, were deeper-drafted than most tank ships in the commercial trade prior to that time; their loaded drafts, about 30 feet 2 inches, were greater than the authorized depths in most southeast harbors. As a result of the entrance of T-2 tankers into general commercial service and of the importance of the movement of petroleum products at southeast ports, a concerted effort was undertaken by local interests to obtain authorization for deeper harbors in the southeast. Thus, through established procedures, another step was taken in the incremental development of navigation facilities. And the trend is continuing. Studies are now underway to ascertain justification for still deeper projects. Requests are being made for depths to accommodate T-2 tankers at other than the major southeast ports. Authorization is being sought for deepening the Mobile Harbor project to the extent that such vessels as the new Venore-class ore carrier with a loaded-draft of about 34 feet 4 inches may serve that harbor.

The total tonnage moved through southeast harbors in 1951 exceeded 46 million tons. Statistics reveal a gain of about 5 million tons over total traffic in 1950. Figure 3 indicates the growth of the commercial movement in the 20-year period, 1932-1951. It will be noted that except for the major restriction on shipping in 1942 and two other minor periods of traffic deficiency, a steady growth has been experienced. An adequate discussion of the basis for such growth of commercial traffic through southeast harbors would undoubtedly include such outstanding factors as modern marine terminals, interconnecting and feeder shallow-draft waterways, land transportation facilities throughout the tributary area, industrialization of the southeast, and development of the natural resources of the region. The economy of the southeast is closely allied to the diversity of commerce through its ports. That economy is high-lighted by three principal commodity groups which move in considerable quantity through the deep water ports, the shallow draft channels, and over land transportation facilities:

a. The receipt and distribution of petroleum products for transportation, industry, home heating, tobacco curing, and mechanized agricultural equipment.

b. The receipt, shipment and distribution of foreign and domestic fertilizer and fertilizer materials for agricultural use in meeting the increasing demands for truck crops, corn, cotton, tobacco, and meat products.

c. The receipt and shipment of wood, paper and related products as a result of the further development by scientific control of the southeast's forest lands.

The overall traffic pattern and the breakdown of traffic types by commodity groups moving over southeast harbors is illustrated by Figure 4. That pattern is dominated by coastwise receipts which account for 38 percent of all traffic. Other traffic types, ranging from 7 to 17 percent of the total traffic, include a wide variety of items and commodity groups moving in both foreign and domestic trade. In illustration of the predominance of the movement of petroleum products in the southeast, it is noted that 38 percent of all traffic

COMPARATIVE STATEMENT OF TRAFFIC

DEEP WATER HARBORS IN THE SOUTHEAST

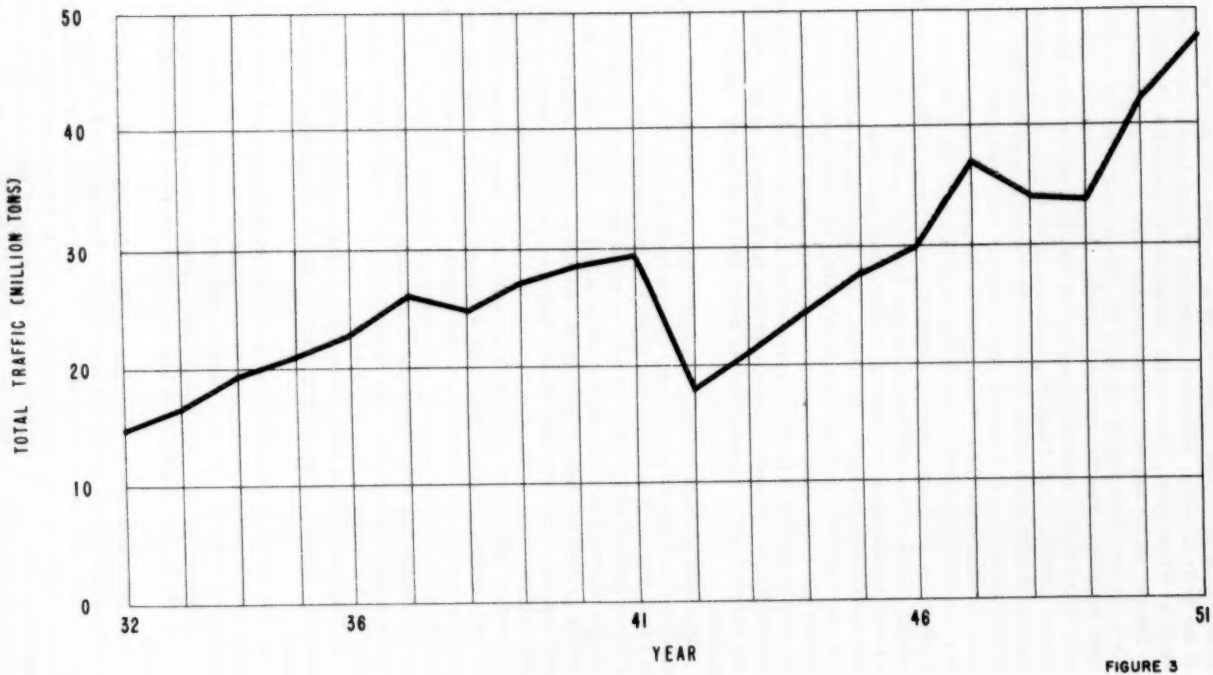

FIGURE 3

CLASSIFICATION OF TRAFFIC (1951)
DEEP WATER HARBORS IN THE SOUTHEAST

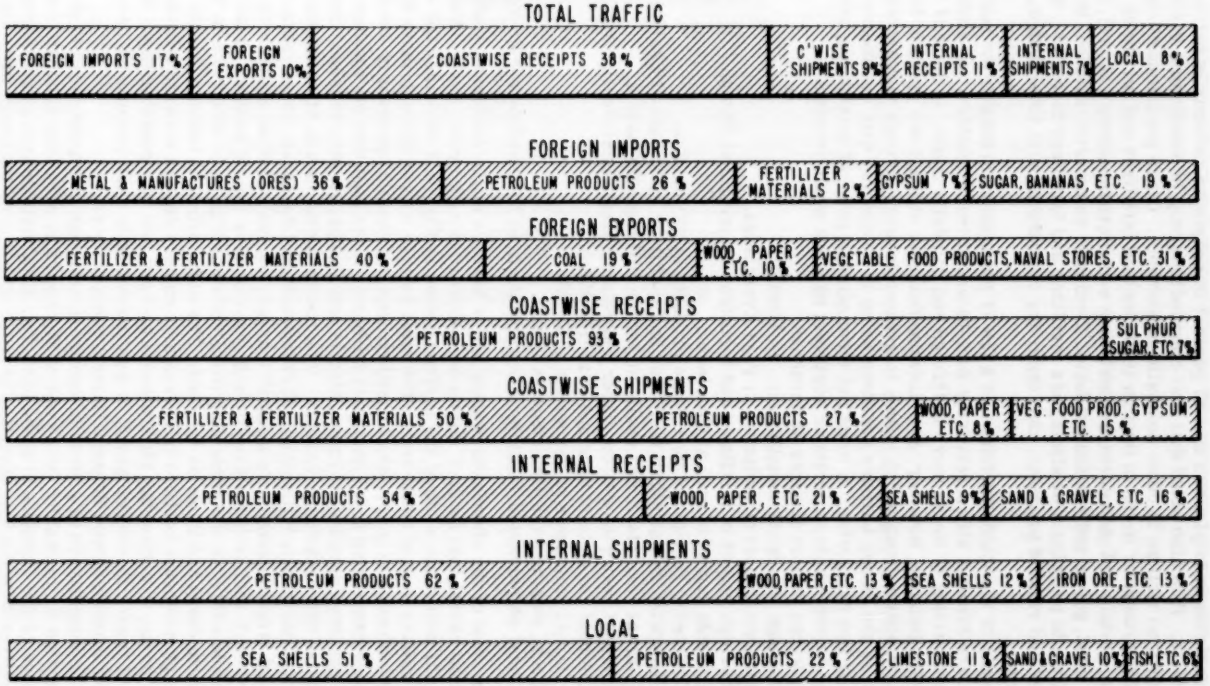

FIGURE 4

is coastwise receipts, and that 93 percent of coastwise receipts is petroleum products. It is also noted that that commodity group is outstanding in foreign imports as well as in other domestic movements. Other predominant commodity groups or items in foreign trade include fertilizer and fertilizer materials, metals and manufactures (including considerable tonnage of ore), coal, and wood, paper and related products. Domestic commerce features, in addition to petroleum products, are fertilizer and fertilizer materials, wood, paper and related products, and, under the classification of local traffic, sea shells.

Many of the major harbors and a few of the lesser harbors of the southeast are favored with a relatively well-balanced traffic pattern. At such ports a wide variety of items move in foreign and domestic trade. In spite of the relative balance, however, each location features at least one specific item or commodity group which moves in greater quantity through that harbor. Most of the lesser harbors are most noted in connection with commerce in one or two categories. A brief but incomplete resume of outstanding commodity movements at pertinent southeast harbors would include:

Foreign import of sugar at Savannah.
Foreign import of metallic ore: at Mobile.
Foreign import of molasses at Port Everglades.
Foreign export of fertilizer and fertilizer materials at Tampa.
Foreign export of coal at Charleston.
Coastwise receipts of petroleum products at Wilmington.
Coastwise shipments of fertilizer and fertilizer materials at Charlotte.
Internal receipts of sea shells at Jacksonville and Pensacola.
Internal receipts of wood, paper and related products at Georgetown.
Internal receipts of sand and gravel at Miami.
Internal shipments of sea shells at Mobile.
Local shipments of limestone at Miami.
Local shipments of inedible animal products at Fernandina and Pascagoula.

In spite of the abundance of deep water harbors in the southeast, traffic studies reveal that most of the tonnage moves through twelve ports. Based on 1951 statistics, each of the harbors shown in Figure 5 accounted for over one million tons of commerce. The total tonnage moved through those harbors amounted to more than 43 million tons, or about 93 percent of the total tonnage accredited to all southeast harbors. It is noted that the tonnages through two Gulf coast harbors, Mobile and Tampa, greatly exceeded the tonnages at other southeast harbors. The four principal south Atlantic coast ports, Charleston, Wilmington, Jacksonville, and Savannah, constituting the second largest group in relation to tonnage, accounted for an equivalent movement; the first three ports in that group very nearly handled equal tonnages in 1951. Of the remaining ports shown in Figure 5, three are on the Atlantic coast and three on the Gulf. The distribution of tonnage moved through southeast harbors is very nearly equally divided between Atlantic and Gulf ports; in comparing all southeast harbors and in comparing those in the list of twelve mentioned above, it was found that in each instance 53 percent of the tonnage moved through Atlantic coast harbors.

The continuance of growth of commerce through southeast ports is directly related to the task of the Corps of Engineers in providing adequate maintenance of the channels in those harbors. Such maintenance is accomplished consistent with the appropriation of funds therefor by the Congress. The task, however, is becoming more complex as the requirements for channel depths and widths increase and as the availability of dredge spoil disposal areas is restricted by further development of harbor shore lines.

LIST OF HARBORS CARRYING OVER ONE MILLION TONS
(IN ORDER OF 1951 TONNAGE)

DEEP WATER HARBORS IN THE SOUTHEAST

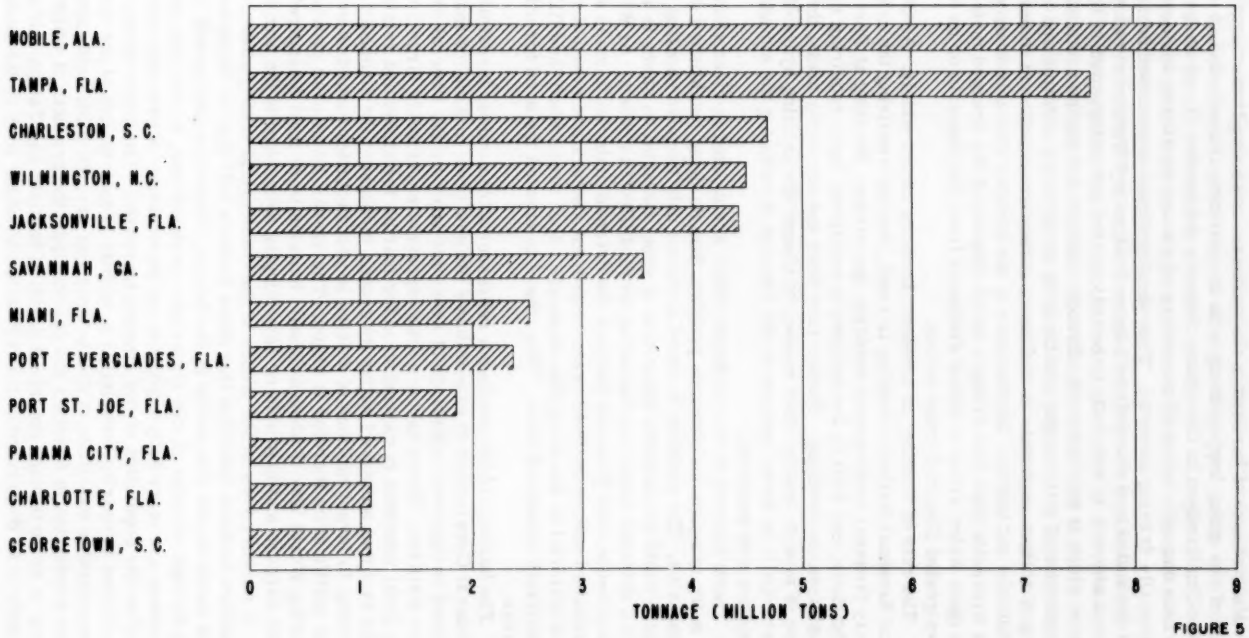

FIGURE 5

Maintenance of harbors in the southeast is accomplished largely by the use of sea-going hopper dredges in the entrance channels and of hydraulic pipe-line dredges in the inteior channels and basins. In all cases the entrance channels cross offshore bars which are shoaled by the deposition of littorally drifting material. That shoal material is removed from the limits of the authorized channels by hopper dredges and dumped at sea at such locations where it is not likely to be transported and redeposited in the channels from which it was removed. Harbor channels and basins are shoaled by the deposition of silt brought into the area by tributary streams and by the shifting of bottom materials in shallower harbor areas adjacent to navigation channels and basins. Maintenance of the interior channels is accomplished by hydraulic pipe-line dredges which dispose of the dredged material either in open-water areas at stated distances from the channels or on specifically designated disposal areas ashore.

The rate of shoaling in southeast harbors varies widely. At Charleston and Savannah harbors shoaling is rapid, thereby requiring the scheduling of very frequent maintenance dredging operations. Shoaling at Port Everglades, Charlotte, and Port St. Joe harbors is relatively light, requiring infrequent maintenance dredging. Studies have been and are being made, through the use of models and by other means, to change the existing hydraulic conditions principally in river harbors in the interest of reducing the amount of maintenance now required.

Those harbors in the southeast which are located in river channels present a more complex maintenance problem than do those established in bays or estuaries. The problem is more acute not only because shoaling is usually more rapid but because deposition of shoal material on shore is required and such disposal areas are becoming more difficult to obtain. At Wilmington, Charleston, and Savannah harbors the dredged material in some reaches is deposited ashore in diked areas to prevent runback and eventual redeposit of the material in the navigation channels. Such areas when thus filled afford desirable industrial sites. Thus, there is created the need for other disposal areas.

The harbors of the southeast represent a tremendous investment by the Federal Government in expenditures for new construction and maintenance. Based on approved standards of economic analysis the Federal expenditures are justified. Those harbors also represent enormously large investments by local interests in expenditures for marine terminals and related facilities. The fact that state port authority groups throughout the southeast are continuing to invest millions of dollars in port facilities furnishes evidence that the justification therefor is sound. The overall investment proved its worth during World War II when southeast harbors were used extensively in handling cargoes and in providing new shipping necessary to the war effort.

A cursory view of the trends in the commercial trade pattern at southeastern harbors indicates that those harbors will play an important role in the water-borne commerce of the future. Expansion and growth is in prospect as foreign sources of raw materials are developed, as our own natural resources are more fully exploited, as the economy of overseas areas improves, and as the population of our country increases. The construction of transfer facilities is nearing completion in Mobile in anticipation of the receipt of considerable quantities of South American ore. New oil fields are coming into production in Alabama and Mississippi, the products of which are beginning to move through southeast ports. Charlotte and Tampa Harbors now handle over 80 percent of the traffic in phosphate rock in the United States;

a substantial increase in that movement appears likely. Tropical fruits are imported in sizable quantities through several southeastern ports. As our population increases, the demand for such imports will increase. Furthermore, as the economy of foreign or offshore areas improves, the potential for export from this country becomes greater.

The discovery and development of sources of supply are resulting in expansion, relocation, and diversification of various elements of industrial enterprise in the southeast. A multiplicity of harbors such as exists in this region causes a dispersal of industry which adds to security in the atomic age, and provides alternate avenues for transport in case of damage to some of the major ports.

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a. Beginning with "Proceedings-Separate No. 200," published in July, 1953, the papers were printed by the photo-offset method.
b. Presented at the Miami Beach (Fla.) Convention of the Society in June, 1953.
c. Presented at the New York (N.Y.) Convention of the Society in October, 1953.
d. Beginning with "Proceedings-Separate No. 290," published in October, 1953, an automatic distribution of papers was inaugurated, as outlined in "Civil Engineering," June, 1953, page 66.
e. Discussion of several papers, grouped by divisions.
f. Presented at the Atlanta (Ga.) Convention of the Society in February, 1954.

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